

Unit 2 Day 11 – Radicals and Complex Numbers – HOMEWORK

REMEMBER: $i^0 = \underline{1}$ $i^1 = \underline{i}$ $i^2 = \underline{-1}$ $i^3 = \underline{-i}$ So all powers of i simplify to i , -1 , $-i$, or 1 .

Find the simplest form of the given power of i :

1) $i^{23} = \underline{-i}$

2) $i^{13} = \underline{i}$

3) $i^{42} = \underline{-1}$

4) $i^{29} = \underline{i}$

5) $i^7 = \underline{-i}$

6) $i^{37} = \underline{i}$

Simplify:

$\sqrt{-4} = \underline{2i}$

$-\sqrt{-25} = \underline{-5i}$

$\sqrt{-169} = \underline{13i}$

$-\sqrt{-121} = \underline{-11i}$

$\sqrt{-36} = \underline{6i}$

Add or Subtract the following imaginary numbers: (Write your answer in $a + bi$ form)

7. $(2 + 3i) + (-6 - 4i) = \underline{-4 - i}$

8. $(23 + 4i) - (-12 + i) = \underline{35 + 3i}$

9. $(-4 - 2i) + (28 - 13i) = \underline{24 - 15i}$

10. $(17 + 4i) - (-19 - 8i) = \underline{36 + 12i}$

Multiply the following imaginary numbers (Write your answer in $a + bi$ form)

11. $3i(2 - 6i) = \underline{18 + 6i}$

12. $(2 + 4i)(-3 - 2i) = \underline{2 - 16i}$

13. $(-12 + i)(9 - 4i) = \underline{-104 + 57i}$

14. $(13 - i)(13 + i) = \underline{170}$

Find the value of the following variables: (Hint: y is **only** the coefficient of i .)

15. $(3 - 2i) - (x + yi) = (2 - 3i)$

$3 - x = 2$ $-2 - y = -3$

$x = \underline{1}$ $y = \underline{1}$

16. $(2 + 4i) + (x + yi) = (7 - 5i)$

$2 + x = 7$ $4 + y = -5$

$x = \underline{5}$ $y = \underline{-9}$

17. $(8 - 2i) - (x + yi) = (2 - 5i)$

$x = \underline{6}$ $y = \underline{3}$

18. $(4 + 2i) + (x + yi) = (5 - 7i)$

$x = \underline{1}$ $y = \underline{-9}$

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USE () for division of complex numbers! Give your answer as a complex number a + bi.
Show all your work on the odd problems. ☺ Check with your calculator.

$$1) \frac{3i}{2-i} = -\frac{3}{5} + \frac{6}{5}i$$

$$2) \frac{4}{6+2i} = \frac{3}{5} - \frac{1}{5}i$$

$$3) \frac{4-i}{-2+i} = -\frac{9}{5} - \frac{2}{5}i$$

$$4) \frac{3+i}{4-3i} = \frac{9}{25} + \frac{13}{25}i$$

$$5) \frac{2i}{9-12i} = \frac{-8}{75} + \frac{2}{25}i$$

$$6) \frac{-4}{i} = 4i$$

$$7) \frac{5+2i}{3-4i} = \frac{7}{25} + \frac{26}{25}i$$

$$8) \frac{6+2i}{6+2i} = 1$$

$$9) \frac{13i}{4-2i} = -\frac{13}{10} + \frac{13}{5}i$$

$$10) \frac{4}{2-i} = \frac{8}{5} + \frac{4}{5}i$$

$$11) \frac{12i}{4} = 3i$$

$$12) \frac{7-3i}{5+2i} = 1-i$$

Simplifying Radicals - show your factors.

$\sqrt{24} = \underline{\quad}$ $\begin{array}{c} \wedge \\ 4 \quad 6 \end{array}$ $2\sqrt{6}$	$\sqrt{50} = \underline{\quad}$ $\begin{array}{c} \wedge \\ 5 \quad 10 \\ \wedge \\ 5 \quad 2 \end{array}$ $\sqrt{5 \cdot 5 \cdot 2}$ $5\sqrt{2}$	$\sqrt{168} = \underline{\quad}$ $\begin{array}{c} \wedge \\ 2 \quad 84 \\ \wedge \\ 2 \quad 42 \\ \wedge \\ 2 \quad 21 \\ \wedge \\ 3 \quad 7 \end{array}$ $2\sqrt{2 \cdot 3 \cdot 7}$ $2\sqrt{42}$
$\sqrt{120} = \underline{\quad}$ $\begin{array}{c} \wedge \\ 2 \quad 60 \\ \wedge \\ 5 \quad 12 \\ \wedge \\ 3 \quad 4 \end{array}$ $2\sqrt{15}$	$\sqrt{46} = \underline{\quad}$ $\begin{array}{c} \wedge \\ 2 \quad 23 \end{array}$ prime $\sqrt{46}$	$\sqrt{124} = \underline{\quad}$ $\begin{array}{c} \wedge \\ 2 \quad 62 \\ \wedge \\ 2 \quad 31 \end{array}$ $2\sqrt{31}$
$\sqrt{78} = \underline{\quad}$ $\begin{array}{c} \wedge \\ 2 \quad 39 \\ \wedge \\ 3 \quad 13 \end{array}$ $\sqrt{78}$	$\sqrt{52} = \underline{\quad}$ $\begin{array}{c} \wedge \\ 4 \quad 13 \\ \wedge \\ 2 \cdot 2 \end{array}$ $2\sqrt{13}$	$\sqrt{146} = \underline{\quad}$ $\begin{array}{c} \wedge \\ 2 \quad 73 \end{array}$ $\sqrt{146}$

All done!